Center for Scientific Review
National Institutes of Health

Scientific Areas of Integrated Review Groups (IRGs)

For a listing of the Scientific Review Administrator and membership roster for each study section, click on the study section roster next to the study section name under an IRG listed below or go to the study section index (study sections listed alphabetically) and click on the specified roster next to the name of the study section.

Last updated on 26th October, 2004

Referral & Review

Bioengineering Sciences and Technologies IRG [BST]

The Bioengineering Sciences and Technologies [BST] IRG will review grant applications that focus on fundamental aspects of bioengineering and technology development in the following areas: gene and drug delivery systems, imaging principles for molecules and cells, modeling of biological systems, bioinformatics and computer science, statistics and data management, instrumentation, chips and microarrays, biosensors, and biomaterials. While biological context is important in bioengineering, a central premise in organizing this IRG is the need for effective review of bioengineering and technology development in early stages before specific practical uses are proven.

Both research project grant (R01, R21, R15, etc.) and Small Business and Innovation Research (SBIR) and Small Business Technology Transfer (STTR) grant applications will be reviewed in the following study sections in the BST IRG:

Gene and Drug Delivery Systems [GDD]
Microscopic Imaging [MI]
Modeling and Analysis of Biological Systems [MABS]
Biodata Management and Analysis [BDMA]
Instrumentation and Systems Development [ISD]
Biomaterials and Biointerfaces [BMBI]

[Back to Top]

Gene and Drug Delivery Systems Study Section [GDD]

[GDD Roster**]**

The Gene and Drug Delivery Systems [GDD] study section will consider grant applications (R01, R21, SBIR/STTR, etc.) focused on the development and delivery of drugs, genes, and gene products that alter gene function or expression in the living organism. Research grant applications driven by bioengineering principle, design, or validation, but not necessarily driven by hypothesis, are expected. Areas include the use of new strategies and tools to alter gene function or expression:

- Agents delivered: Include DNA, RNA, RNA interference (RNAi), antisense oligonucleotides, large and small insert vectors, aptamers, peptide nucleic acids (PNAs), small molecule activators and inhibitors, antibiotics, vaccines, peptides, proteins, cells, and other drugs.

- Vehicles: Include viral and other vectors, liposomes, polyethylene glycol (PEG), and lipid-based transfection agents.

- Delivery strategies: Include electroporation, ultrasound, receptor mediated translocation, opto-injection, ballistic methods, vesicles, and viral agents.

- Gene regulation of active agents: Includes enhancers and silencers, tissue specificity, external control, nuclear vs. cytoplasmic localization, and targeted integration.

- Expression patterns: Include tissue and cellular localization, markers for expression, copy number, transcriptional and translational products, and activity-dependent probes.

GDD has the following shared interests within the BST IRG:

- With Microscopic Imaging [MI]: The GDD study section shares interests with the MI study section in the areas of cellular imaging as a readout, e.g., activity dependent probes, expression patterns, interaction probes, and single molecule reporters. Normally, applications focusing on imaging technology and development will be assigned to MI. Applications focusing on the delivery vehicle could be assigned to GDD.

- With Instrumentation and Systems Development [ISD]: GDD shares interests with the ISD study section in the area of instruments for gene and drug delivery. Applications on nano or microfabricated delivery vehicles and ballistic methods could be assigned to GDD. Design and development of instrumentation to deliver samples and to monitor delivery could be reviewed by ISD.

- With Modeling and Analysis of Biological Systems [MABS]: GDD shares interests with the MABS study section in the areas of gene regulatory networks, metabolic pathways and studies to perturb individual genes or regulatory factors. Applications on systems biology could be assigned to MABS. Applications on the delivery and expression of introduced genes, or on the restoration and enhancement of metabolic pathways could be assigned to GDD.

- With Biomaterials and Biointerfaces [BMBI]: GDD could be assigned studies on using biomaterials to deliver genes and drugs into cells. BMBI could be assigned related studies emphasizing synthesis, physical characterization, biocompatibility, and toxicity of new synthetic materials intended for use as gene or drug delivery vehicles.

GDD has the following shared interests outside the BST IRG:

- With the Biological Chemistry and Macromolecular Biophysics [BCMB], Cell Biology [CB], and Biology of Development and Aging [BDA] IRGs: Grant applications focused on basic biological mechanisms may be relevant to one or more of the IRGs indicated above. Applications focused on the design, development, and introduction of technology in support of gene, drug, and cell delivery are relevant to GDD.

- With the Genes, Genomes, and Genetics [GGG] IRG: Applications addressing research questions in genetics could be reviewed by the GGG IRG, whereas applications that are more broadly technology oriented or where an applied endpoint is not specified could be reviewed by GDD.

- With the Health of the Population [HOP], Risk, Prevention and Health Behavior [RPHB], and Biobehavioral and Behavioral Processes [BBBP] IRGs: Grant applications focused on basic health behavior and behavioral genetics are relevant to the indicated IRGs. Grant applications focused on the design, development, and introduction of technology in support of gene and drug delivery are relevant to GDD.

- With the Immunology [IMM] IRG: Grant applications focused on basic immunological mechanisms could be assigned to the IMM IRG. Grant applications focused on the design and development of technology in support of gene and drug delivery, and development of delivery strategies based on antibodies, could be assigned to GDD.

- With the Infectious Diseases and Microbiology [IDM] and AIDS and Related Research [AARR] IRGs: Grant applications focused on infectious diseases and virology mechanisms, including diagnostics, vaccines, and delivery mechanisms, could be assigned to either IDM or AARR. Applications focused on developing technologies to introduce genes and drugs in a basic virology context or developing viral vectors for delivery could be assigned to GDD.

- With the Oncological Sciences [ONC]; Hematology [HEME]; Cardiovascular Sciences [CVS]; Endocrinology, Metabolism, Nutrition, and Reproductive Sciences [EMNR]; Musculoskeletal, Oral, and Skin Sciences [MOSS]; Digestive Sciences [DIG]; Respiratory Sciences [RES]; and Renal and Urological Sciences [RUS] IRGs: Grant applications focused on organ/disease specific biological mechanisms and therapies could be assigned to the relevant organ/disease indicated IRG. Applications focused on basic or developing technologies to introduce genes and drugs in a general cellular context could be assigned to GDD.

- With the Surgical Sciences, Biomedical Imaging and Bioengineering [SBIB] IRG: SBIB shares interests with GDD in the delivery of drugs, genes, and gene products. Development of delivery techniques could be reviewed in SBIB if the objective of the study is to address questions of either diagnosis or pathology. If the study objective is to address questions of basic delivery techniques, or techniques for which specific applied endpoints are not defined, review could be in GDD.

- With the Molecular, Cellular, and Developmental Neuroscience [MDCN]; Integrative, Functional, and Cognitive Neuroscience [IFCN]; and Brain Disorders and Clinical Neuroscience [BDCN] IRGs: Grant applications focused on neuroscientific mechanisms could be assigned to one of the indicated IRGs. Applications focused on the design, development, and introduction of technology for gene and drug delivery in nervous systems could be assigned to GDD.

[Back to Top]

Microscopic Imaging Study Section [MI]

[MI Roster**]**

The Microscopic Imaging [MI] study section reviews applications (R01, R21, SBIR/STTR, etc.) that aim to develop, improve and implement quantitative techniques for the static and dynamic visualization of molecules, macromolecular machines and complexes, organelles, cells, and model systems in physiologically active states. Large animal and human studies will not be considered in MI. Examples of methodologies relevant to MI include crystallography, TEM (transmission electron microscopy), electron cryomicroscopy, SEM (scanning electron microscopy), ESEM (environmental scanning electron microscopy), AFM (atomic force microscopy), SFM (scanning force microscopy), fluorescence microscopy and laser spectroscopy including microarray/chip analysis, confocal and scanning light microscopy,vibrational spectroscopic microscopy, multi-photon microscopy, x-ray microscopy, acoustic microscopy, NMR (nuclear magnetic resonance) and microscopic applications of MRI (magnetic resonance imaging). Imaging principles or instruments may be developed, and proposals need not be hypothesis-driven.

Specific areas covered by MI:

- Development and Improvement of Instrumentation for Microscopy: major microscopic devices and accessories such as specimen holders and environmental chambers for molecules, assemblies or living cells; high resolution and large pixel detectors, high-resolution film scanners, specimen preparative apparatus, computer automation of data collection and remote access.

- Improvement of Specimen Preparation Methodology:crystallization of membrane proteins and large assemblies, chemical and cryo specimen preservations, non-invasive preparative methods, chemical agents for contrast enhancement, molecular tagging, cell labeling, genetically expressed labels and studies of chemical and radiation damage effects.

- Image Analysis: Validation of image formation theory, data management, phasing methods, algorithm development including filtering, signal detection, data reduction, image enhancement, pattern recognition, restoration, reconstruction, segmentation, feature extraction, visualization of multi-dimensional information, and high throughput, automatic data processing at the cellular or subcellular level.

- Data Mining: Integration of information derived from complementary imaging techniques and bioinformatics to derive functional mechanisms.

MI has the following shared interests within the BST IRG:

- With Gene and Drug Delivery Systems [GDD]: MI shares interests with the GDD study section in the areas of cellular imaging as a readout, e.g., activity dependent probes, expression patterns, interaction probes, and single molecule reporters. Applications that focus on the delivery vehicle could be assigned to GDD. Applications focusing on imaging technology and development could be assigned to MI.

- With Instrumentation and Systems Development [ISD]: Applications focusing on the instrument per se could be assigned to ISD. If the focus is on imaging data analysis, then MI could be the appropriate home for review.

- With Biodata Management and Analysis [BDMA]: If the focus is on image archiving, then BDMA may be the appropriate home. However, if the focus is on generation of images, then MI may be the appropriate home for review.

- With Biomaterials and Biointerfaces [BMBI]: MI shares interests with the BMBI study section in development of new materials for use as image enhancers and contrast agents. MI may review applications emphasizing small molecule and soluble contrast agents, whereas BMBI may review applications emphasizing development of new polymeric or nanoparticle based contrast agents or where materials synthesis, characterization, biocompatibility, and toxicity are prominent.

MI has the following shared interests outside the BST IRG:

- With the Biological Chemistry and Macromolecular Biophysics [BCMB] IRG: The BCMB IRG generally reviews applications on specific biological/chemical systems whereas MI is focused on general methodology and technology. Applications focusing on synthesis of imaging agents could be assigned to BCMB; applications focusing on application of agents to new imaging approaches could be assigned to MI.

- With the Genes, Genomes, & Genetics [GGG] IRG: An area of shared interest may be molecular image analysis, e.g., of fluorescence in situ hybridization (FISH) datasets or microarray/chip datasets. Applications addressing research questions that are linked to genetic problems could be reviewed by the GGG IRG, whereas molecular imaging studies that are more technology oriented or where specific uses are not identified could be reviewed by MI.

- With the Cell Biology [CB] IRG: High throughput cell imaging studies would be an area of shared interest. Applications addressing research questions focused on cell biology mechanisms or processes could be assigned to the CB IRG; applications addressing the technology of high throughput cell imaging could be assigned to MI.

- With the Infectious Diseases & Microbiology [IDM] and AIDS & Related Research [AARR] IRGs: Applications focused on research questions related to infectious disease and virology could be assigned to IDM or AARR; applications focused on technology necessary for molecular or cellular imaging of microbes could be assigned to MI.

- With the Oncological Sciences [ONC] IRG: Radiation damage due to therapeutic radiation could be assigned to ONC. Radiation damage due to specimen analysis could be referred to MI.

- With the Surgical Sciences, Biomedical Imaging and Bioengineering [SBIB] IRG: Shared interests are expected in development of instrumentation, techniques, and procedures for imaging molecules and organelles with study sections in SBIB. If the objective of the study is to address questions of diagnosis, pathology, or treatment, assignment could be to SBIB, e.g., contrast agents for medical imaging. If the study objective is to address questions of either mechanism or basic biology, assignment could be to MI, e.g., contrast agents for microscopic imaging MI typically will not review applications involved with large animals and human subjects.

[Back to Top]

Modeling and Analysis of Biological Systems [MABS]

[MABS Roster**]**

The Modeling and Analysis of Biological Systems [MABS] study section will review applications (R01, R21, SBIR/STTR, etc.) that develop modeling/enabling technologies for understanding the complexity of biological systems. Research grant applications driven by bioengineering principle, design, or validation, but not necessarily driven by hypothesis, are expected. The scope of interactions reviewed here ranges from molecular to supramolecular and cellular in prokaryotic and eukaryotic cells, and to organelle and to tissue in eukaryotic systems. For these applications, the integration of interactions through levels and scales and the emergence of patterns that help to explain system behavior are the ultimate goals for applying these tools.

Specific areas covered by MABS:

- Modeling methods: Data integration into models; computational systems and tools for model construction, analysis, and simulation; sensitivity analysis; optimization techniques; dimensional analysis; structural analysis (topology); emergent properties of complex systems; model visualization; in silico modeling; multiscale/multilevel modeling; and modeling of evolving and adaptive systems.

- Specific models of important processes: signal transduction; biochemical networks; gene regulatory networks; metabolic networks; computer simulations; intracellular dynamics; cell structural dynamics; analysis of large datasets.

- Integration of modeling and experiment: experimental validation of models; tools for analysis of assemblies, complexes, and networks; cell and molecular interactions; network reconstruction; high-throughput data integration; combinatorial approaches to genomics, proteomics and glycomics data.

- Development and adaptation of mathematical methods and models: stochastic, Boolean, continuous; dynamical systems analysis; timescale and spatial decomposition; stiff systems; sparse systems; finite difference and finite element approaches to spatial modeling.

MABS has the following shared interests within the BST IRG:

- With Gene and Drug Delivery [GDD]: MABS shares interests with the GDD study section in the areas of gene regulatory networks, metabolic pathways and studies to perturb individual genes or regulatory factors. Applications on systems biology could be assigned to MABS. Applications on the development and expression of introduced genes, and the restoration or enhancement of metabolic pathways could be assigned to GDD.

- With Biodata Management and Analysis [BDMA]: MABS shares interests with the BDMA study section in the areas of bioinformatics and large-scale data collection efforts or "–omics" applications (genomics, proteomics, metabolomics, etc.). If the focus is on modeling or computer simulations, review by MABS would be appropriate. If the focus is on large-scale data analysis, then BDMA would be appropriate.

- With Instrumentation and Systems Development [ISD]: MABS shares interests with the ISD study section in the area of high throughput technologies. If the focus is on modeling data from high throughput studies, review by MABS would be appropriate. If the focus is on the development of high throughput instrumentation, then ISD would be appropriate.

MABS has the following shared interests outside the BST IRG:

- With the Biological Chemistry and Macromolecular Biophysics [BCMB]; Cell Biology [CB]; and Biology of Development and Aging [BDA] IRGs: MABS shares computational modeling interests with BCMB, CB, and BDA. If the focus is experimental investigation of chemical or biophysical interactions among molecules, cell physiological processes, development, differentiation, or signal transduction, then review by the IRGs identified above could be appropriate. If the primary focus is development of technology for computational modeling or development of methods for combining modeling or related analyses, review by MABS could be appropriate.

- With the Genes, Genomes, and Genetics [GGG] IRG: If the focus is regulation of gene expression or genomics, review by GGG could be appropriate. However, if the primary focus is modeling technology or related analyses, review by MABS could be appropriate.

- With the Infectious Diseases & Microbiology [IDM] and AIDS & Related Research [AARR] IRGs: If the scientific focus is on application of existing modeling paradigms to microbes, assignment to IDM or AARR could be appropriate; if the scientific focus is on development of new modeling paradigms for microbes or related computational analyses, assignment to MABS could be appropriate.

- With the Oncological Sciences [ONC] IRG: Review by ONC could be appropriate if cancer cell physiology, signal transduction, or therapy is the focus. If the focus is modeling or related analyses, then review by MABS could be appropriate.

- With the Surgical Sciences, Biomedical Imaging and Bioengineering [SBIB] IRG: MABS shares interests with SBIB in the areas of biological and medical computing and informatics as related to modeling physiological function. If the objective of the study is to address questions of diagnosis, pathology, or therapy, assignment could be to SBIB. If the objective of the study is to address questions of basic biology, modeling, or simulation, assignment could be to MABS.

[Back to Top]

Biodata Management and Analysis Study Section [BDMA]

[BDMA Roster]

The Biodata Management and Analysis [BDMA] study section will review grant applications (R01, R21, SBIR/STTR, etc.) that aim to develop technologies for the management and analysis of basic biological data, i.e., bioinformatics, computational biology, and computer science. This includes the review of data management technology in support of large-scale data collection and integration efforts. Research grant applications driven by bioengineering principle, design, or validation, but not necessarily driven by hypothesis, are expected.

Specific areas covered by BDMA:

- Methods for data management including: Data representation, standards and ontology development, data capture, data integrity and validation, data archiving, data distribution, data query, hardware and software for computer systems, database robotics, and interoperation and federation of databases.

- Methods for data analysis including: Numerical, statistical and mathematical methods; theoretical approaches to design and interpretation of large-scale studies, such as high throughput analyses; computational methods for organizing, maintaining, and integrating datasets, such as in proteomics and genomics.

- Visualization techniques: Summary, integration, and representation of data in meaningful ways, for example, graphical, auditory, tactile, and visual; methods for data mining, World Wide Web and other server representations and computer representations and simulations.

BDMA has the following shared interests within the BST IRG:

Most of the study sections in this IRG will involve some level of the management of data generated by their projects. The BDMA study section would be the appropriate home when basic methodology for data management is the central scientific or technical question. The following shared interests merit highlighting:

- With Microscopic Imaging [MI]: If the focus is on generation of images, then MI would be the appropriate home for review; however, if the focus is on image archiving, then BDMA would be the appropriate home.

- With Modeling and Analysis of Biological Systems [MABS]: BDMA shares interests with the MABS study section in the areas of bioinformatics and large scale data collection efforts or "–omics" applications (genomics, proteomics, metabolomics, etc.). If the focus is on large-scale data analysis, then BDMA would be appropriate. If the focus is on modeling, review by MABS would be appropriate.

- With Instrumentation and Systems Development [ISD]: BDMA has shared interests with the ISD study section in areas of data acquisition, analysis software, and hardware. If the focus is on data storage and manipulation, then BDMA would be appropriate. If the focus is on hardware or instrument development for data collection, then ISD would be appropriate.

BDMA has the following shared interests outside the BST IRG:

- With the Biological Chemistry and Macromolecular Biophysics (BCMB); Cell Biology (CB); Biology of Development and Aging (BDA) IRGs: If the focus is on the use of computational or database tools for analysis of chemical or biophysical interactions among molecules, cell physiological processes, development, differentiation, or signal transduction, then review by one of the IRGs identified above could be appropriate. If the primary focus is on development of computational or database tools, review by BDMA could be appropriate.

- With the Genes, Genomes, and Genetics [GGG] IRG: If the focus is on experimental or computational investigation of questions related to genetics, regulation of gene expression, or genomics, review by GGG

could be appropriate. If the primary focus is on developing database technology, related computational analyses, or statistical methods for analyzing data, including genetic/genomic data, review by BDMA could be appropriate.

- With the Health of the Population [HOP] IRG: HOP reviews applications related to population processes, composition and distribution, and the development and validation of methodologies for population research, including measurement, design, and statistical analysis. Other statistical methodology applications could be reviewed by BDMA.

- With the Infectious Diseases & Microbiology [IDM] and AIDS & Related Research [AARR] IRGs: If the focus is on experimental or computational investigation of questions related to microbes, assignment to IDM or AARR could be appropriate; if the focus is on developing database technology, related computational analyses, or statistical methods for analyzing data, including infectious disease and virology data, assignment to BDMA could be appropriate.

- With the Surgical Sciences, Biomedical Imaging and Bioengineering [SBIB] IRG: BDMA shares interests with SBIB in the area of management of biological and medical data. If the objective of the study is to address questions of diagnosis, pathology, treatment, or medical data management, assignment could be to SBIB. If the objective of the study is to address questions of basic data management or biology, assignment could be to BDMA.

[Back to Top]

Instrumentation and Systems Development [ISD]

[ISD Roster**]**

The Instrumentation and Systems Development [ISD] study section will consider research applications (R01, R21, SBIR/STTR, etc.) seeking to design and develop novel instrumentation and systems for biological research. Although a test biological problem may be used to provide context, grant applications referred to this study section need not necessarily be hypothesis driven. Specific areas of interest include:

- Analytical instrumentation: The design and development of novel instrumentation for biological research. Examples are mass spectrometry, magnetic resonance spectroscopy, x-ray, neutron and electron crystallography, solution scattering, and 2D and 3D imaging technologies for fluorescence, scanning tunneling microscopy, atomic force microscopy, electron microscopy, vibrational spectroscopic microscopy, x-ray photoelectron spectroscopy, and hardware and computer systems.
- Sensing devices: Approaches to the detection and quantification of biologically important molecules, including both small molecule and macromolecular species. The development of such devices may require new surface chemistries and chemical, electrical, or other detection modalities, and may range in scope from devices for the analysis of a single analyte species to devices for the parallel analysis of thousands or millions of species. Also of interest are sensors of endogenous electric and magnetic fields in biological systems.
- Separation technologies: Improvements and variations to classical techniques such as electrophoresis and chromatography, as well as the exploration and development of novel approaches, including molecule, assembly, and cell separations, microfluidics, and nanotechnology.
- Robotics and automation: The design and development of both individual instrumentation modules and integrated robotic systems for the automation of chemical or biological reactions or processes. Systems for the large-scale acquisition of multivariate information from biological systems also are of interest.
- Synthesis: Instruments for the synthesis of biomolecules at various scales.
- Micro/nanofabrication: Microfabricated and/or nanostructured devices and systems for use in biological research.
- Single molecule/cell approaches: Techniques, approaches, and devices for the analysis of biological systems

at the single molecule, assembly, or single cell level.

ISD has the following shared interests within the BST IRG:

Many of the study sections of the BST IRG will involve instrumentation at some level. The ISD study section would be the appropriate home when the central scientific or bioengineering question is design and development of instrumentation and methods of analysis. The following shared interests merit highlighting:

- With Gene and Drug Delivery Systems [GDD]: Applications on nano or microfabricated delivery vehicles and ballistic methods could be assigned to GDD. Applications on design and development of instrumentation to deliver samples and to monitor delivery could be reviewed by ISD.

- With Microscopic Imaging [MI]: If the focus is on the design or development of imaging instrumentation per se, then ISD may be the appropriate home. If the focus is on imaging data analysis, then MI may be the appropriate home for review.

- With Modeling and Analysis of Biological Systems [MABS]: ISD shares interests with the MABS study section in the area of high throughput technologies. If the focus is on using high throughput technologies for modeling or modeling datasets from high throughput assays, review by MABS may be appropriate. If the focus is on the development of high throughput instrumentation, then ISD may be appropriate.

- With Biodata Management and Analysis [BDMA]: ISD has shared interests with the BDMA study section in the areas of data acquisition, analysis software, and hardware. If the focus is on data storage management, and manipulation, then BDMA may be appropriate. If the focus is on developing hardware or instrument development for data collection, then ISD may be appropriate.

- With Biomaterials and Biointerfaces [BMBI]: ISD has shared interests with the BMBI study section in the areas of development of microarray and nanoscale technologies and in sensing devices and associated surface chemistries. Applications with a principal focus on materials and surface chemistry may be directed to BMBI, whereas applications with a major emphasis on developing instrumentation for materials fabrication or use may be directed to ISD.

ISD has the following shared interests outside the BST IRG:

Multiple study sections in other IRGs will involve adaptation of instrumentation and analytical methods to specific biological, medical, or organ situations. If the focus is on the specific organ, system, or disease, then other IRGs may be appropriate. However, if the focus is on the design or development of the basic instrument or analytical method, ISD may be appropriate. Specific shared interests are:

- With the Biological Chemistry and Macromolecular Biophysics [BCMB] IRG: ISD shares interests with BCMB in the development and application of novel approaches to study molecular structure and interactions. In cases where the dominant emphasis of the application is on bioengineering or biomaterials, the application may be assigned to ISD. If the dominant emphasis of the application is on the chemistry or biophysics, the application may be assigned to BCMB.

- With the Cell Biology [CB] IRG: Cell separations would be an area of shared interest between CB and ISD. Applications that use cell separation technologies to address research questions related to cell biology could be assigned to the CB IRG; applications addressing the technology of cell separations could be assigned to ISD.

- With the Infectious Diseases & Microbiology [IDM] and AIDS and Related Research [AARR] IRGs: Grant

applications focused on biosensors for detecting infectious agents could be assigned to IDM or AARR. Applications focused on developing detection technologies could be assigned to ISD.

- With the Surgical Sciences, Biomedical Imaging, and Bioengineering [SBIB] IRG: If the objective of the study is to address development of instruments for diagnosis, pathology, or treatment, the application may be directed to SBIB. If the objective of the study is to address development of instruments for understanding basic engineering and design principles, biological mechanisms or basic biology, the application may be directed to ISD.

[Back to Top]

Biomaterials and Biointerfaces Study Section [BMBI]

[BMBI Roster**]**

The Biomaterials and Biointerfaces Study Section [BMBI] will review grant applications (R01, R21, SBIR/STTR, etc.) in materials science and the closely allied field of materials surfaces and their interactions with basic biological systems. The material aspects of biomaterials and surface science concern the design principles and theory and the synthesis, characterization, and optimization of new or existing materials including polymers, composites, metals, ceramics, nanomaterials, hybrid systems of natural and synthetic polymers, and biomimetics. The biological aspects of biomaterials science concern interactions of materials with proteins, membranes, cells, and tissues including studies related to scaffolds for tissue repair/tissue engineering, materials for bioreactors, biocompatibility issues, and microcirculation aroundimplanted biomaterials. Grant applications concerned with biomaterials, biointerfaces, and biofunctional design need not be hypothesis driven, but may use known fundamental principles or theory to discover new basic approaches useful for understanding biological phenomena.

Specific areas covered by BMBI:

- Research and development of efficient methods to assess biocompatibility of materials including: Predictive, low-cost in vitro and in vivo models with a focus on reliability, accelerated testing, failure analysis, imaging, and improved understanding of the biology-biomaterials interface.

- Molecular/cellular interfacial interactions including: Protein adsorption, cell adhesion, differentiation and growth, biomolecule function at interfaces, nonfouling surfaces, and bioactive surfaces.

- New materials development including: Design principles, synthesis of polymers, metals, ceramics, composites, glasses, carbons, biomimetic/bioinspired strategies for synthesis, structure-property relationships of biomaterials, bulk characterization of biomaterials, biodegradable and bioresorbable materials, material processing, and combinatorial approaches to the synthesis of new biomaterials.

- Nanoscience and nanotechnology including: Nanoparticles, nanostructured surfaces, nanocomposites, nanodevices, and multifunctional nanoparticles.

- Biomaterials properties including: Biocompatibility, blood/material interactions, toxicity, structure/property relationships, and biodurability.

- Drug delivery systems including: Carrier materials, fabrication of micro-scale devices, and biocompatibility.

- Gene delivery systems including: Carrier materials, preparation of biomaterials, biocompatibility, and fabrication of delivery devices.

- Chip- and microarray-based microtechnology including: Patterning, immobilization chemistry, nonfouling chemistry, detection modalities, MEMS (micro-electro-mechanical systems), lithography, and microfluidics.

- Tissue engineering including: New biomaterials and fabrication techniques for tissue engineering, cell-biomaterial interactions, transport and perfusion aspects of tissue engineering, bioreactors, cell and specific cell biology engineering.

- Self-assembled materials including: Block copolymers, surface assembly, protein assembly, biosignal delivery using self-assembled materials, biorecognition, liposomes, and tethered biomembrane mimics.

- Biosurface characterization and technology including: Surface analysis, surface modification, lubricity and tribology, and patterning.

- Biosensors including: Biorecognition, biocompatibility, nonfouling surfaces, and fouling mechanisms.

BMBI has the following shared interests within the BST IRG:

- With Gene and Drug Delivery Systems [GDD]: The GDD and BMBI study sections have shared interests in development and application of synthetic and biological materials for gene and drug delivery, including the incorporation of genetic material into bulk biomaterials, e.g., for enhancement of tissue engineering strategies. GDD could be assigned studies the use of biomaterials to deliver genes and drugs into cells. BMBI could be assigned related studies emphasizing synthesis, physical characterization, biocompatibility, and toxicity of new synthetic materials intended for use as gene or drug delivery vehicles.

- With Microscopic Imaging [MI]: The BMBI and MI study sections share an interest in development of new materials for use as image enhancers and contrast agents. BMBI may review applications emphasizing development of new polymeric or nanoparticle based contrast agents or where materials synthesis, characterization, biocompatibility, and toxicity are prominent, whereas the MI study section may review applications emphasizing small molecule and soluble contrast agents for use in microscopic and micro-imaging applications.

- With Instrumentation and Systems Development [ISD]: The BMBI and ISD share interests in the areas of development of microarray and nanoscale technologies and in sensing devices and associated surface chemistries. Applications that focus on the materials and surface chemistry for a wide range of purposes may be directed to BMBI, whereas applications with major emphasis on materials fabrication for use in instrumentation development may be directed to ISD.

BMBI has the following shared interests outside the BST IRG:

Common interests with other IRGs include:

- Genes, Genomes, and Genetics [GGG]; Cell Biology [CB]; Biology of Development and Aging [BDA]; Immunology [IMM]; Infectious Diseases & Microbiology [IDM]; AIDS and Related Research [AARR]; Oncological Sciences [ONC]; Hematology [HEME]; Endocrinology, Metabolism, Nutrition, and Reproductive Sciences [EMNR]; Digestive Sciences [DIG]; Respiratory Sciences [RES]; Renal and Urological Sciences [RUS]; Molecular, Cellular, & Developmental Neuroscience [MDCN]; Integrative, Functional, & Cognitive Neuroscience [IFCN]; Brain Disorders and Clinical Neuroscience [BDCN] IRGs: Because biomaterials and biointerfaces are relevant to a wide variety of biological and medical devices that are utilized in biological, medical, and clinical applications, BMBI has extensive interests in common with other IRGs. Where the issues involve researchand development on new materials or biocompatibility, assignment may be to BMBI. Where tissue integration and application to specific biological and medical devices and systems are primary foci, assignment to one of the other IRGs above may be appropriate.

- With the Biological Chemistry and Macromolecular Biophysics [BCMB]: Applications that focus on chemistry or biophysics could be assigned to BCMB. Applications that focus on chemistry or biophysics of

surfaces and biomaterials could be assigned to BMBI.

- With the Cardiovascular Sciences [CVS] IRG: Due to the fundamental role of surfaces in triggering thrombosis and other blood and tissue reactions, the development of cardiovascular devices, including stents, heart valves, vascular grafts, artificial hearts, ventricular assist devices and others, is a significant area of overlap between CVS and BMBI. Applications on developing such devices for specific clinical or biomedical applications could be assigned to CVS (or SBIB). Basic research and development applications on materials and surfaces that might be used for such devices could be assigned to BMBI.

- With the Musculoskeletal, Oral and Skin Sciences [MOSS] IRG: Grant applications on dental and orthopedic implants or tissue integration could be assigned to MOSS, whereas grant applications on basic research and development of materials and surfaces that might be used for such implants could be assigned to BMBI.

- With the Surgical Sciences, Biomedical Imaging & Bioengineering [SBIB] IRG: Basic research and development of biomaterials and biocompatibility may be reviewed in BMBI, whereas research and development of biomedical materials for specific medical devices or specific clinical applications, may be reviewed in SBIB.

[Back to Top]

[Referral & Review]

CSR Home Page